5.0 PROPOSED CLEANUP ACTIONS

5.1 REMEDIAL ACTION OBJECTIVES

The Site remedial action objectives are intended to protect human health and the environment by eliminating, reducing, or otherwise controlling risks posed through each exposure pathway and migration route. They are developed considering the characteristics of the contaminated medium, the characteristics of the hazardous substances present, migration and exposure pathways, and potential receptor points.

Based on the remedial investigation results, soils and ground water are the contaminated media at the Site. The volume of impacted soil at the Site, based on exceedances of the cPAH cleanup level, is estimated to be 92,100 cubic yards. At least 2.5 feet of fill material covers the majority of the contaminated soils except for the surface or near surface soils at the ATC property. Fill materials range up to approximately 30 feet in thickness, and are thickest on the western portion of the Site and near the river. The volume of contaminated soil for the top 5 feet is estimated at 8,900 cubic yards while the estimated contaminated soil volume above the ground water level is estimated to be 24,630 cubic yards. The majority of the impacted soil is below the ground water table (see Figures 5 and 6); 67,470 cubic yards of contaminated soil or around 73% of the total is in ground water.

Mobile contaminants leaching into ground water at the Site undergo natural attenuation. Current data show that contaminants are found at very low levels in the surface water and sediments in the Spokane River, and in ground water surrounding the contaminated area. This condition is unlikely to change unless there is an increase or significant change in ground water flow or hydraulic gradient, disturbance of the area occupied by the contaminants, or increase in concentrations in ground water at or near the source due to chemical changes.

The remedial action objectives (RAOs) for the Site are:

- Prevent human exposure (direct contact, ingestion, and inhalation) to contaminated soils at the Site.
- Minimize the leaching of contaminants from soils to ground water and surface water.
- Prevent erosion of impacted soils to the Spokane River.
- Prevent ingestion and exposures (direct contact, ingestion, and inhalation) to contaminated ground water.

- Prevent changes in hydrogeologic conditions that will likely cause migration of contaminated ground water to the Spokane River or to areas outside of the impacted soils area in concentrations that exceed cleanup standards.

- Ensure that Spokane River is not impacted by any future significant increase in mass flux of contaminants through storm water migration.

- Prevent contaminated ground water, with concentrations above cleanup levels, from migrating beyond the conditional point of compliance established in accordance with WAC 173-340-720(6)(c).

- Ensure that NAPL is not mobilized.

5.2 SUMMARY OF FEASIBILITY STUDY CLEANUP ALTERNATIVES

Remedial technologies that are applicable to soils and ground water were evaluated in the Feasibility Study Report, GEI Consultants, Inc., 2000. A preliminary screening phase eliminated technologies that were not implementable at the Site. The technologies that were considered for implementation to site soils were:

- Institutional Controls/Access Restrictions

- In-situ Containment Technologies/Process Options

    - Capping
    - Shallow slurry wall
    - Jet grout wall

- In-situ Treatment Technologies/Process Options

    - Solidification/stabilization
    - Bioremediation
    - Streambank bioengineering

- Ex-situ Treatment Technologies/Process Options

    - Excavation
    - Off-site or on-site LTTD
    - Landfilling

The ground water technologies retained were:

- Institutional Controls/Access Restrictions
- Ground Water Monitoring
- Containment Technologies/Process Options
    - Capping
    - Shallow slurry wall
    - Jet grout wall
- In-situ Treatment Technologies/Process Options
    - Natural attenuation
    - Bioremediation/air sparging
- Ground Water Extraction Technologies/Process Options

Remedial technologies/process options were combined to develop remedial alternatives for the Site. After an initial screening of the alternatives, five alternatives (A through E) were retained for detailed analysis according to MTCA criteria. Four of the alternatives rely on containment with one alternative involving partial removal of contaminated soils. The removal or treatment in place of all of the contaminated soils that reach 80 feet in depth, most of which is in ground water, has been determined to be not feasible due to concerns regarding implementability, mobilization of the contaminants, safety, management of a large volume of water, and cost.

5.3 CLEANUP ACTION ALTERNATIVES

5.3.1 Alternative A: Limited Soil Capping, Natural Attenuation, Ground Water Monitoring, and Institutional Controls

This alternative consists of capping a limited portion of the ATC property with 2 feet of crushed stone, gravel or other select fill where surface or near surface contamination is present. The area proposed for capping is limited to an approximate 8,500 square feet area located in the west portion of the former ATC area, specifically along the roadway traversing the west portion of the ATC area and the areas between and immediately adjacent to the two buildings. Natural attenuation, as shown by data from the RI Report, prevents the migration of contaminated ground water off-site or to the Spokane River at rates that could cause exceedances to cleanup levels. Long-term ground water monitoring will determine if contaminants continue to be mostly contained/destroyed inside the contaminated area. Institutional controls will include deed restrictions that will prevent ground water use and land use restrictions in order to prevent unacceptable exposures to contaminants and to prevent further migration of contaminants.

5.3.2 Alternative B: Low Permeability Cap, Natural Attenuation, Ground Water Monitoring, and Institutional Controls

This alternative involves installing a low permeability cap, such as asphalt or a High Density Polyethylene (HDPE) flexible membrane liner system. A stormwater drainage and disposal system would be required to control surface water. Natural attenuation, ground water monitoring, and institutional controls would be the same elements as in Alternative A.

5.3.3 Alternative C: Shallow Excavation of Soils and Filling to 15 Feet Over the Site, Natural Attenuation, Ground Water Monitoring, and Limited Institutional Controls

This alternative would consist of excavating impacted soils to an approximate depth of 1 foot above the seasonal high groundwater table (or approximately 10 feet below grade), disposal or thermal treatment of the soil off Site, covering the remaining contaminated soil with 15 feet of imported (clean) fill. Natural attenuation, ground water monitoring would be conducted as in Alternative A. Institutional controls would include deed restrictions that would prevent ground water use and land use restrictions in order to prevent unacceptable exposures to contaminants and prevent further migration of contaminants. There would be no restrictions on ground intrusive activities to the top 15 feet of soils.

5.3.4 Alternative D: Shallow Barrier Wall Installed Between the Site and River, Limited Soil Capping, Natural Attenuation, Ground Water Monitoring, and Institutional Controls

This alternative includes all the elements of Alternative A plus the installation of a shallow, hanging barrier wall parallel to the Spokane River along the Site boundary. A hanging barrier wall is not keyed into a low permeability layer or aquitard at the bottom of the aquifer.

5.3.5 Alternative E: Streambank Bioengineering, Limited Soil Cap, Natural Attenuation, Ground Water Monitoring, and Institutional Controls

This is Alternative A with the addition of streambank bioengineering that would consist of placing a concrete revetment mat or HDPE geocell layer, or similar technology as determined in the Engineering Design Report, along an appropriate length of shoreline, backfilling the mat or layer with soil, and establishing a vegetative cover within the backfill soil.